DOCUMENT RESUME

ED 365 256 HE 027 049

AUTHOR Polson, Alasdair
TITLE Understanding and Managing Shock: A Core Curriculum for an Intensive Care Unit.
PUB DATE 29 Oct 93
NOTE 13p.; Curriculum Design Project, Queen's University, Ontario, Canada.
PUB TYPE Guides - Classroom Use - Teaching Guides (For Teacher) (052) -- Dissertations/Theses - Undetermined (040)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS Clinical Diagnosis; Cognitive Style; *Curriculum Design; Evaluation; Foreign Countries; *Graduate Medical Education; Higher Education; *Learning Modules; Medical Schools; Medical Services; Needs Assessment; Teaching Methods
IDENTIFIERS *Royal College of Physicians and Surgeons of Canada; *Shock

ABSTRACT

This paper describes a 2-week curriculum designed to give graduate level physicians an understanding of the pathophysiology of shock and to enable them to diagnose and manage deranged oxygen metabolism in critically ill patients. The curriculum is predicated on an extensive needs assessment and addresses the unique characteristics and learning styles of graduate level physicians in residency training programs. The curriculum opens by stating the unit aim and offering explanation and rationale for in-depth study of shock and its management. A following section describes the context for the curriculum as part of a specialty training program at the Royal College of Physicians and Surgeons of Canada. The curriculum lists pre-requisites and entry characteristics of those in the program listing formal educational qualifications as well as a variety of personal characteristics. A section on needs assessment notes that the objectives of the module are based on research into the concepts, skills and attitudes needed to diagnose and treat shock. Objectives and performance criteria include eight points of knowledge, four skills, three attitudes, and one process. Proposed assessment is on a continuous basis during the training. Instruction details include the schedule for the 2 weeks and suggested strategies and evaluation methods. (JB)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

SCOPE OF INTEREST NOTICE

The ERIC Facility has assigned this document for processing to: CE

In our judgment, this document is also of interest to the Clearinghouses noted to the right. Indexing should reflect their special points of view. HE

ED 365 256

UNDERSTANDING AND MANAGING SHOCK:

A Core Curriculum for an Intensive Care Unit.

Dr. Alasdair Polson

Faculty of Medicine
Queen's University
Division of Respiratory and Critical Care Medicine

Submitted for : Basic Principles of Curriculum Design
Education 800
Dr. David Pratt
Faculty of Education
Queen's University

October 29, 1993.

HE 027 049

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY

Alasdair Polson

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

☑ This document has been reproduced as received from the person or organization originating it.

☐ Minor changes have been made to improve reproduction quality.

• Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

BEST COPY AVAILABLE

"And I said of medicine, that it is an art which considers the constitution of the patient, and has principles of action and reasons in each case."

Plato: Georgias

"The outlook is always serious. In severe cases death may occur within twenty-four hours, and in fatal cases life is rarely prolonged for more than seven or eight days."

Sir William Osler: On Septicaemia.
The Principles and Practices of
Medicine (1892)

AIM:

To provide physicians with an understanding of the pathophysiology of shock and to enable physicians to efficiently diagnose and manage deranged oxygen metabolism in critically ill patients.

RATIONALE:

Shock is defined as a circulatory state in which inadequate tissue perfusion leads to progressive organ dysfunction which, if not reversed, results in irreversible organ damage and death. Despite impressive diagnostic and therapeutic advances in the management of patients experiencing shock over the past three decades, mortality rates remain high once the syndrome is fully established. These patients are critically ill, often requiring prolonged intensive care at significant costs.

All physicians, no matter where they practice, will at some point in their careers be called upon to assist in the management of a patient in early or established shock. Rapid and effective intervention is required to impede the progression of this serious disorder and ultimately impact directly on patient survival. Appropriate attitudes, knowledge and skills are needed in order for the physician to intervene effectively. These abilities are all the more important for physicians training to be specialists in the fields of Internal Medicine, Surgery, Anaesthesia and Emergency Medicine, as they will ultimately be consulted for their expertise in managing critically ill patients. It is therefore imperative that these physicians are exposed to critically ill patients, including those in shock, during their residency training and that they have an understanding of the pathophysiologically of shock and are skilled in the therapeutic interventions necessary to care for these patients.

CONTEXT:

This curriculum is designed for residents in specialty training programs leading to certification by the Royal College of Physicians and Surgeons of Canada (RCPSC) including Internal Medicine, Surgery, Anaesthesia and Emergency Medicine. It is to be implemented during the first two weeks of the clinical rotation in the Intensive Care Unit (ICU), generally of two to three months duration. Although mandatory, individual choice, program requirements and logistical constraints all impact on the exact timing of the ICU rotation during the residency.

This module, with its' focus on the diagnosis and management of shock, represents just one part of the entire two month core ICU curriculum. The entire curriculum encompasses the development of a broad knowledge base with respect to disease processes, technologic interventions and attitudes including empathy, effective communication and ethical considerations. Since an understanding of the concepts and proficiency of all of the skills covered in this curriculum are essential to a successful ICU rotation, the best time to cover this material is during the first two weeks in the ICU. This allows for further expansion of the knowledge base in subsequent weeks and

continued practice of the skills during the rotation, as well as early remediation of any difficulties encountered.

The ICU is a combined medical and surgical fifteen bed unit at the Kingston General Hospital which is a tertiary referral centre and regional trauma centre. The residents provide clinical coverage throughout the day, and each resident provides twenty-four hour a day coverage once very four to five days, including weekends. This clinical experience is under the direct supervision of an ICU Co-Director who is an attending physician, anaesthesiologist or surgeon. The six Co-Directors share clinical responsibility for patients in the ICU on a weekly rotational basis and are primarily responsible for the daily didactic and clinical teaching during their week on-call.

PRE-REQUISITE AND ENTRY CHARACTERISTICS:

The pre-requisites necessary to enter an accredited RCPSC specialty training program are straight forward and include:

1. holding an MD Degree from an accredited medical school, and
2. holding a valid educational or other licence from the provincial College of Physicians and Surgeons.

The entry characteristics of the physicians involved in the curriculum, however, are quite varied. The majority are adults in their twenties and in their second post-graduate year since medical school. Others are older physicians who have returned from General Practice to enter specialty training programs (as is often the case in Anaesthesia). This individual diversity is further enhanced as the cultural and educational backgrounds and ages of the candidates entering medical school is increasingly varied. The medical schools themselves are extremely diverse in their curricula and how well they train their graduates in the necessary skills for self-directed learning. Every rotation has between four and six residents, all from different programs and each with different aptitudes, knowledge bases and skills. The insight, maturity and confidence with which these residents approach mastering the objectives will necessarily be different and consideration of these individual characteristics is vital to the successful implementation of the curriculum.

NEEDS ASSESSMENT:

The development of specific objectives for this module was predicated on identifying the essential concepts, skills and attitudes necessary to diagnose or manage patients in early or established shock. This was accomplished by:

1. interviewing all of the ICU Co-Directors involved in caring for these patients,
2. review of the RCPSC specific requirements and guidelines for accreditation of Residency Programs in General Internal Medicine, Anaesthesia, General Surgery and Emergency Medicine.
3. review of the Canadian Critical Care Society proposed educational objectives for critical care training of rotating residents in Canada, and
4. careful review of the ICU rotation evaluations by rotating residents between July 1991

and December 1992.

The individual characteristics and needs of the residents are assessed by interviewing them individually at the beginning of each rotation, identifying with them specific goals to be accomplished in addition to the explicit curriculum objectives and modifying the instructional methods appropriately to accommodate their unique circumstances. Those with more ICU experience (eg. senior Anaesthesia residents returning for their required second or third ICU rotation) are offered more opportunity for self-directed learning under supervision and have more of a role in educating their peers. Less experienced residents are more dependent on the didactic and bedside teaching sessions which occur daily in small groups and individually with the ICU Co-Director or Critical Care Medicine Training Fellow.

OBJECTIVES AND PERFORMANCE CRITERIA:

1. KNOWLEDGE:

The physician will understand:

(a) the definition and diagnostic criteria for the different types of shock. {Critical}
Performance Criterion:
The resident will give the correct definition of shock and at least five etiologic examples of shock (eg. myocardial infarction, infection, haemorrhage, spinal cord transection and anaphylaxis).

(b) The concepts of cardiovascular pre-load, after-load and contractility and the factors that influence these parameters. {Critical}
Performance Criterion:
The resident will draw the Frank-Starling (pressure-volume) curve and correctly describe how changes of pre-load, after-load and cardiac contractility would alter the position of the patient on the curve four out of five times.

(c) The factors that influence the normal relationship between tissue oxygen delivery and utilization. {Critical}
Performance Criterion:
The resident will write the formula: oxygen delivery=cardiac output x arterial oxygen content and expand this formula to its component parts correctly (heart rate x stroke volume x haemoglobin concentration x oxygen saturation) without error.

(d) The different mechanisms of hypoxemia and the physiology of the haemoglobin-oxygen dissociation curve. {Important}
Performance Criterion:
The resident will correctly state at least four out of five physiologic causes of hypoxemia and give three examples of ventilatory-perfusion mismatching. As well, the resident will draw the haemoglobin-oxygen dissociation curve, correctly demonstrate how changes in at least three physiologic factors would alter the

position of the curve, and discuss the tissue oxygen effect of shifting the curve.

(e) The pathophysiology of the sepsis syndrome, adult respiratory distress syndrome (ARDS) and multiple organ dysfunction syndrome (MODS). {Important}
Performance Criterion:
The resident will correctly define the sepsis syndrome, ARDS and MODS and briefly discuss the pathophysiology the of sepsis syndrome in terms of the initial insult, activation of inflammatory mediators, hemodynamic and tissue effects, and prognostic implications.

(f) The pathophysiology of respiratory failure including the concept of work of breathing and be able to recognize the signs and symptoms of impending respiratory failure. {Critical}
Performance Criterion:
The resident will correctly define respiratory failure and give at least five clinical examples of excessive work of breathing. In addition, the resident will list at least five signs and symptoms of impending or established respiratory failure and correctly explain the physiology of respiratory alternans and abdominal paradox.

(g) The physiologic basis of the treatment of shock using intravenous crystalloid and colloid volume resuscitation as well as inotropes and vasopressor agents. {Critical}
Performance Criterion:
The resident will correctly state at least three advantages and disadvantages each of crystalloid and colloid fluid resuscitation. As well, given different clinical scenarios of patients in shock, the resident will correctly select the most appropriate inotrope or vasopressor (Dopamine, Dobutamine, Noradrenaline, Adrenaline) four out of five times based on the pharmacologic attributes of the drugs and the underlying pathophysiologic state.

(h) The indications, complications and different methods of mechanical ventilation. {Critical}
Performance Criterion:
The resident will list at least six indications and four complications of mechanical ventilation. Provided with different clinical scenarios of respiratory failure, the resident will correctly chose the most appropriate form of ventilatory support four out of five times.

2. SKILLS:

The physician will be able to:

(a) Correctly diagnose impending respiratory failure, shock and hypoxemia using clinical skills and laboratory data. {Critical}
Performance Criterion:
Given a patient with appropriate clinical signs and symptoms and relevant laboratory data, the resident will correctly identify the presence of impending or established respiratory failure, shock and hypoxemia within five minutes.

(b) Efficiently access the central venous compartment through the femoral, subclavian and internal jugular routes. {Critical}
Performance Criterion:
The resident will position the patient correctly, identify the relevant anatomy and using sterile technique successfully access the internal jugular, subclavian or femoral vein within ten minutes and no more than three attempts. Complications of inadvertent arterial access or a pneumothorax must be recognized and addressed immediately.

(c) Correctly place and interpret the data derived from a Swan-Ganz (right heart) catheterization. {Important}
Performance Criterion:
From an internal jugular or subclavian vein approach and using sterile technique, the resident will introduce the Swan-Ganz catheter through the central line, inflate the balloon and carefully advance the catheter through the right heart to the pulmonary artery. The resident will immediately identify the wave forms of the vena cava, right atrium, right ventricle, pulmonary artery and pulmonary capillary wedge pressure and interpret the pressures measured as normal, increased or decreased. Malposition of the catheter must be recognized by interpretation of the wave forms and pressure readings and the catheter withdrawn and repositioned immediately.

(d) Efficiently intubate critical ill patients using a variety of techniques. {Critical}
Performance Criterion:
The resident will correctly position and pre-oxygenate the patient with an AMBU bag and oral airway and have oropharyngeal suction readily available. In the event of an awake intubation, the appropriate pre-mediations and dosages will be used. Using a laryngoscope, the resident will intubate the trachea through a trans-oral approach within three minutes and no more than three attempts. Verification of the endotracheal tube placement will be demonstrated by listening over the right and left chest and epigastric area. Malposition of the tube must be recognized immediately and repositioned correctly using the above method.

3. ATTITUDES:

(a) The physician will have confidence in his/her ability to diagnose and manage patients in impending or establish shock. {Important}
Performance Criterion:
The resident will demonstrate an increased proficiency with the above knowledge and skills in an organized and appropriate diagnostic and therapeutic approach to the patient presenting in shock. Development of this attitude will be assessed through close observation over the course of the ICU rotation.

(b) The physician will recognize his/her own limitations in the necessary knowledge and skills when dealing with specific critically ill patients and demonstrate a

(b) The physician will recognize his/her own limitations in the necessary knowledge and skills when dealing with specific critically ill patients and demonstrate a willingness to involve the appropriate care givers in a timely manner. {Critical}
Performance Criterion:
When presented with a clinical situation requiring specialized interventions (eg. an acute abdomen requiring surgical assessment, progressive renal failure requiring dialysis, complete heart block requiring a pacemaker insertion etc), the resident will quickly recognize the need for consultation and convey the urgency to the appropriate specialist. This ability will also be assessed throughout the rotation by observing the resident at the bedside.

(c) The physician will demonstrate empathy for the patient and their family, and be able to communicate in understandable terms a realistic short and long term prognosis for a given patient. {Important}
Performance Criterion:
The resident's interactions with patients, family members, and other health care professionals will be observed throughout the rotation and the ability to establish a professional rapport and to communicate understandability and effectively will be assessed.

4. PROCESS:

(a) The physician will utilize the knowledge and skills emphasized in this curriculum on a daily basis in dealing with critically ill patients during the ICU rotation. {Critical}
Performance Criteria:
The nature of the rotation is such that the resident will take primary responsibility for several critically ill patients daily, including their examination, problem identification, diagnostic work-up and therapeutic interventions including procedures. In addition, the resident will take night call every fourth day and be responsible for assessing all new admissions to the ICU during a twenty-four hour period. These clinical interactions will be closely observed by the attending ICU physicians who will also review the admission and progress notes written by the resident and provide guidance during the twice daily ward rounds.

ASSESSMENT:

Mastery of the objectives by the residents is assessed on a continuous basis during the initial two week module as well as throughout the entire two month rotation. This formative assessment occurs both through close observation by the attending ICU physicians on a daily basis as well as by frequent questioning during the daily didactic sessions, twice daily working rounds and individual interactions at the bedside. Because many of the objectives being taught are clinically useful almost immediately to the residents, this ongoing assessment and feedback is highly relevant and an integral part of the clinical learning experience.

In addition to the immediate bedside feedback, a more cumulative formative assessment is discussed with the resident midway through the rotation by the Medical Director. In addition to strengths, specific areas of weakness are identified in order that they may be addressed and rectified before the final assessment is completed by the end of the rotation. Specific remediation is undertaken with respect to resolving identified deficits.

No formal grade is assigned on the end-of-rotation assessment. Achievement of the performance criteria for all of the critical objectives is required for a satisfactory evaluation. Particular strengths and weaknesses are commented upon in writing and may alter the specific final assessment. If a resident receives an unsatisfactory evaluation, the options are discussed by the Medical Director with the resident and the specific program director and, if necessary, with the Associate Dean of Post-Graduate Education. Possible actions include recommending repeating part or all of the clinical rotation.

No formal final examination is in place for the ICU or any other clinical rotation during the residency training. Individual specialty training programs produce yearly in-training evaluation reports (ITERS) based on the cumulative assessment of the resident during the clinical rotations and supplemented by yearly written, oral and/or observed structured clinical encounters (OSCE) examinations. A final ITER (FITER) is prepared at the end of the residency program and if satisfactory, the candidate must then successfully undergo a specialty-based written and oral examination by the Royal College of Physicians and Surgeons before qualifying as a specialist.

INSTRUCTION:

Schedule:

The objectives of this module serve as a foundation for the rest of the ICU curriculum, and will therefore be addressed during the first two weeks of the rotation. The small group seminars will occur at approximately ten o'clock each day after the morning bedside work rounds have been completed, allowing patient care issues to be addressed immediately as well as allowing the resident who was on-call the previous night to participate before going home. Bedside clinical teaching will occur throughout the remainder of the day, generally through individual interactions between the residents and the ICU Co-Directors or the Critical Care Medicine Fellow. Demonstration of specific technical skills as well as supervised opportunities to practice these techniques will occur throughout the ICU rotation with emphasis on the less experienced residents having more direct instruction and practice during the first two week period.

All the residents will be present on the first day for an orientation session to the ICU as well as for individual interviews to determine their specific backgrounds, goals and interests. They will have already received the ICU residents' handbook prior to the rotation, and will have some idea of the entire ICU Core Curriculum as it is outlined in the handbook. More senior residents with previous ICU experience will be specifically required to identify objectives to be achieved that are appropriate to their level of training, specific program requirements and their personal career goals. These residents

	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY
WEEK 1 AM	ORIENTATION INDIVIDUAL INTERVIEWS	SEMINAR: SHOCK AND OXYGEN DELIVERY OPERATING ROOM: INTUBATION SKILLS (TWO RESIDENTS)	SEMINAR: CARDIOVASCULAR PHYSIOLOGY SWAN-GANZ (RIGHT HEART) CATHETER DEMONSTRATION	SEMINAR: VOLUME AND PHARMACOLOGIC MANAGEMENT OF SHOCK OPERATING ROOM: INTUBATION SKILLS (TWO RESIDENTS)	SEMINAR: SEPSIS SYNDROME, ADULT RESPIRATORY DISTRESS SYNDROME (ARDS), MULTIPLE ORGAN DYSFUNCTION SYNDROME (MODS)
WEEK 1 PM	CENTRAL LINE ACCESS DEMONSTRATION CENTRAL LINE KITS: TAKE HOME			INTERACTIVE CASE MANAGEMENT SESSION: VIDEOTAPE/COMPUTER SIMULATION	SELF-DIRECTED LEARNING: FOCUS ON NEWER THERAPIES VERSUS SEPSIS,ARDS,MODS
WEEK 2 AM	SEMINAR: RESPIRATORY FAILURE	SEMINAR: HYPOXEMIA OPERATING ROOM: CENTRAL LINE SKILLS (TWO RESIDENTS)	SEMINAR: MECHANICAL VENTILATION-1	SEMINAR: MECHANICAL VENTILATION-2 OPERATING ROOM: CENTRAL LINE SKILLS (TWO RESIDENTS)	SMALL GROUP DISCUSSION: PRINCIPLES OF ETHICS*
WEEK 2 PM	SMALL GROUP DISCUSSION: NEWER THERAPIES VERSUS SEPSIS, ARDS, MODS		BEDSIDE DEMONSTRATION: HANDS-ON MECHANICAL VENTILATORS		SELF-DIRECTED LEARNING: IDENTIFY TOPICS FOR RESIDENTS SEMINARS#

* First of four sessions on Ethics during the ICU rotation
# Each resident must give at least one seminar during the rotation.

will have a greater responsibility for more in-depth self-directed learning, and will be challenged at a higher level during the rotation. As well, their expertise will be solicited to contribute directly to the education of their peers.

STRATEGIES:

Although daily seminars on specific subject areas are the backbone of the curriculum, the vast majority of learning occurs "on the job", at the bedside caring for critically ill patients under close supervision. This experience allows residents to incorporate factual knowledge in a practical sense as well as develop and maintain their technical skills. They are the primary care givers, and must interact and communicate with other members of the health care team as well as with patients and their families.

In addition, residents are highly motivated professionals who are continually reading the medical literature in preparation for their eventual RCPSC qualifying examinations. This reading is often more focused during specific clinical rotations, and certainly the ICU experience is very demanding because it is often very unfamiliar territory. The attending staff often suggest specific references that are particularly useful, but the onus is definitely on the resident to take responsibility for his/her own learning. This is accomplished in a concrete sense by having the residents identify a subject area which they will research and present during a seminar at least once during their rotation.

Other learning tools immediately available to the residents including interactive video and computer programs in the ICU on specific subject areas (eg. pharmacologic management of patients with different forms of shock), a library and computer program to do literature searches directly in the ICU, and a computerized patient data base allowing the residents to keep track of all of the patients they have taken care of during their ICU rotation including specific diagnoses and procedures performed. A skills station for practising intubations and other procedures on models is in the preliminary stages of development.

PROGRAM EVALUATION:

The entire ICU rotation is evaluated in writing by every resident at the end of their rotation. Specific comments are sought regarding workload, quality of different teaching formats, skills training and individual Co-Director performance. Earlier feedback is sought informally by the Medical Director during the mid-rotation formative assessment interviews. These evaluations are discussed by the Co-Directors and appropriate modifications undertaken.